

(19)

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(11)

EP 1 054 373 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.11.2000 Bulletin 2000/47

(51) Int Cl.7: **G09F 9/00**(21) Application number: **00660089.4**(22) Date of filing: **18.05.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

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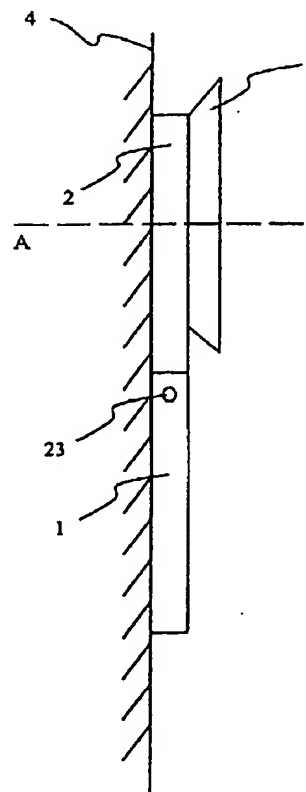
(30) Priority: **20.05.1999 FI 991147**

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(54) Display apparatus

(57) The object of the invention is a display apparatus comprising a display and, connected to the display (3), a base part which forms a support surface for supporting the display apparatus on a substantially planar surface. The display apparatus is characterised in that

- the display (3) and the base part can be moved in relation to each other, at least to a first operating position and to a second operating position, of which in the first operating position the direction of the support surface differs substantially 90 degrees from the direction of the support surface in the second operating position, and
- further the base part of the display apparatus comprises fastening means for fastening the display apparatus to a substantially planar surface.

**Fig. 1a**

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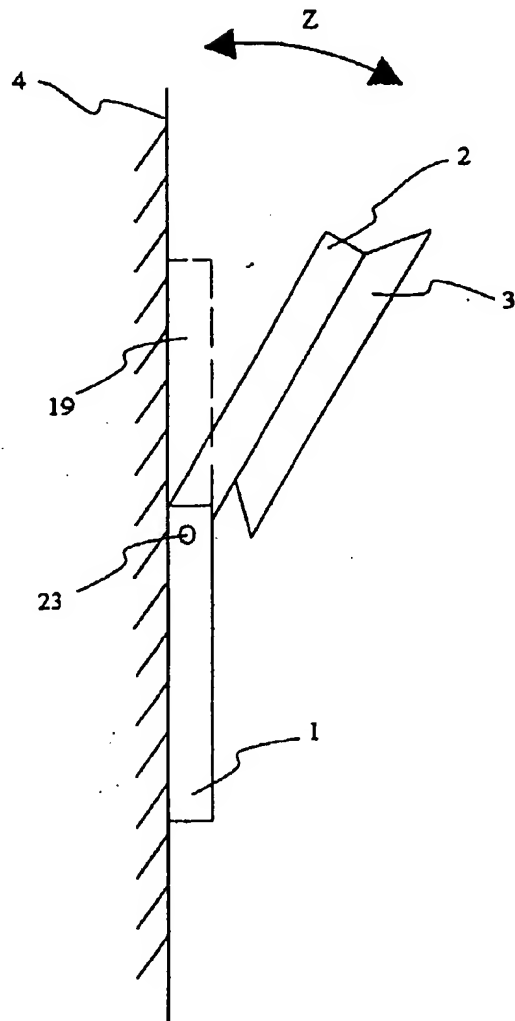


Fig. 1b

Description

[0001] The invention relates to a display apparatus comprising a display and, connected to the display, a base part which forms a support surface for supporting the display apparatus on a substantially planar surface.

[0002] Flat displays are lighter than traditional displays provided with cathode ray tubes, so they are more easily mounted on a wall. Thus flat displays can be mounted with the aid of lighter wall fasteners than the traditional displays, and even on light partition walls. The wall installation saves table space, and the viewing distance can be increased so that it is longer than previously.

[0003] Prior art flat displays generally have a fixed base part, supported on which the display can be arranged on a table top. Such displays can not be mounted on vertical surfaces. If the base part can be detached, it may be removed and the display could be mounted on a wall etc. This requires then for instance separate wall fasteners. There may also be already fasteners on the backside of the display, but then a wall installation of the display requires that the display apparatus is taken apart (the base part and the display).

[0004] Further, if the base part can be detached from the display, the cables between the base part and the display must be sufficiently long, so that the connection between the parts can be maintained disregarding the detachment of the base part. Alternatively both the display and the base part can be provided with connectors, whereby a longer cable is refitted between them for the wall installation. It is also possible to use solutions where the cables do not pass through the base part.

[0005] In such applications the height or inclination of the display can not be adjusted after the fastening.

[0006] These problems can be solved with a display apparatus according to the invention which is characterised in that

- the display and the base part can be moved in relation to each other, at least to a first operating position and to a second operating position, of which in the first operating position the direction of the support surface differs substantially 90 degrees from the direction of the support surface in the second operating position, and
- further the base part of the display apparatus comprises fastening means for fastening the display apparatus to a substantially planar surface.

[0007] The display apparatus according to the invention can be fastened to a planar surface which is horizontal, vertical, or otherwise directed, without disassembling the apparatus. Thus the wall installation is rapid and easy. The display is further sufficiently light-weight, so that it can be easily fastened even on a light wall and without any robust fastening means. According to a preferred embodiment of the invention the base part can

be arranged below the display apparatus when the apparatus is fastened to a vertical surface.

[0008] According to a further preferred embodiment of the invention the base part of the apparatus comprises a support part and an arm part. On a horizontal surface the apparatus can be placed so that it is supported by the support part. The inclination of the display in relation to a vertical surface as well as its location in the height direction can be adjusted with the aid of the arm part, without detaching the apparatus from the surface.

[0009] Further the display can be arranged in a vertical or in a horizontal position, without detaching the apparatus from the surface, by twisting it around a certain rotational axis when the display apparatus is fastened to a planar surface.

[0010] Thus a display apparatus according to the invention can be fastened to a vertical surface so that the mechanical adjustments of the display remain substantially the same as in a table top installation.

[0011] Further, an audio or a multimedia equipment can be located in the base part, which the equipment comprises for instance speakers, a microphone and/or a camera, and other control arrangements. According to a preferred embodiment of the invention the base part is located below the display in the wall installation, whereby any audio equipment and adjustment arrangements are easy to use. Further, space for the apparatus cables can be arranged in the arm part.

[0012] The invention is described in more detail in the following figures, in which:

Figures 1a and 1b show a display apparatus according to a first embodiment of the invention fastened to a wall;

Figures 2a and 2b show a display apparatus according to a second embodiment of the invention mounted on a table;

Figures 3a and 3b show different positions of the display apparatus according to the second embodiment of the invention and a preferred arrangement of the cables of the display apparatus;

Figure 4 shows the wall installation fasteners of a display apparatus according to a third embodiment of the invention;

Figure 5 shows a display apparatus according to a fourth embodiment of the invention fastened to a wall;

Figures 6a and 6b show a display apparatus according to a fifth embodiment of the invention placed on a table and fastened to a wall;

Figures 7a and 7b show a display apparatus according to a sixth embodiment of the invention

placed on a table and fastened to a wall; and

Figure 8 shows a front view of a display apparatus according to a seventh embodiment of the invention.

[0013] Figure 1a shows a side view of the display apparatus according to the first embodiment of the invention fastened to a wall. The figure shows the support part 1 and the arm part 2 of the apparatus base as well as the display 3. The figure further shows a wall 4, to which the support part 1 of the base is fastened. The support part 1 of the apparatus base is arranged below the display 3, and the arm part 2 is fastened with any technique known per se, such as with a joint 23, at one end of the base part 1. The display 3 is twisted into the vertical or the horizontal position by twisting it in relation to an axis A passing perpendicularly through the display apparatus. The vertical and the horizontal positions of the display 3 are shown in more detail in figures 3a and 3b.

[0014] Figure 1b shows a side view of the display apparatus according to the first embodiment of the invention fastened to a wall and inclined in relation to the wall. The display 3 is inclined, supported by the arm part 2 of the base, in the direction Z in relation to the wall 4, when the support part 1 of the base is fastened to the wall 4. The support part 1 and the arm part 2 of the base are arranged to be mutually connected with any means known per se, such as a hinge, over which the display 3 can be inclined in the Z direction. The figure further shows with a broken line an alternative structure of the support part of the base. The alternative structure 19 has the form of a thick U, whereby the arm part is fastened inside the arc of the U. Such a structure is particularly stable in a table top installation, as the branches of the U significantly enlarge the support area.

[0015] Figure 2a shows further a side view of the display apparatus of the second embodiment of the invention mounted on a table top. The support part 1 of the base part is arranged on the table surface 5, whereby the arm part of the base can be arranged in relation to the support part 1 in a desired inclination, like in the wall installation. The figure further shows how control means 6 for the display 3 are mounted in the base part of the apparatus. The display control means 6 comprise means for making the basic controls of the display, such as the contrast and brightness of the display 3 and the position and width of the picture in the display 3. In the presented embodiment the arm part of the base part is a two-part structure and comprises an upper part 7 to which the display is fastened, and a lower part 8, which is fastened to the support part 1 with a means known per se, such as a hinge.

[0016] Figure 2b shows also in a side view the height adjustment of a display apparatus according to the second embodiment of the invention. The height of the apparatus can be adjusted in the Y direction with the aid of the arm part of the base. The height adjustment is

made with the aid of a guide 9 between the upper part 7 and the lower part 8, the guide being any prior art solution known per se. The figure further shows schematically the audio equipment 10 and a number of controls 11 located in the base part of the apparatus. In a solution according to a preferred embodiment of the invention these means 10 located in the base part of the display as well as the controls 6, 11 are arranged in the base part of the apparatus which in a wall installation is located below the display, whereby they are easily manipulated.

[0017] Figure 3a shows in view from the back the display apparatus of the second embodiment of the invention where the display 3 is in a horizontal position, and figure 3b shows the display 3 in the vertical position. The position of the display is changed by twisting the display in relation to an imaginary axis, as is presented in figure 1a. A twisting of the display in this manner so that it is vertical or horizontal is known per se. Figure 3a shows in addition a way to arrange the cables according to a preferred embodiment of the invention. In the lower part 8 of the arm part of the apparatus base part 1 there is arranged a space 13 for the cables 12, and in this space 12 the cables are protected when the apparatus is being placed in different positions. In addition, in this way, there is space for the cables to be connected to the display also in a wall installation.

[0018] Figure 4 shows the wall fasteners of the display apparatus of the third embodiment of the invention as seen from below the support part of the base. Preferably two wall installation fasteners 14 are arranged behind (as seen in relation to the display) of the support part 1 of the apparatus base, whereby the figure presents one embodiment with which the apparatus is fastened to screws etc. arranged in the wall. The wall installation fasteners 14 can be any prior art fasteners, and a required number of the fasteners can be used in order to provide a robust fastening.

[0019] Figure 5 shows in a side view a display apparatus according to the fourth embodiment of the invention fastened to a wall. The apparatus comprises the support part 1 of the base part which is fastened to a wall 4, a display 3 which is fastened to the arm part 2 of the base part, and an extension arm of the base part which extension comprises an upper part 15, an extension part 16 and a lower part 17. The upper part 15 of the extension arm is fastened to the arm part 2 with any joint-like means known per se, for instance with a ball joint 18. The display 3 and the arm part 2 can be inclined in relation to the wall and the rest of the apparatus with the aid of the joint 18. The lower part 17 of the extension arm is also fastened to the support part 1 with a joint-like means known per se, such as a hinge.

[0020] Figure 6a shows in a side view a display apparatus according to the fifth embodiment of the invention mounted on a table. The display apparatus comprises a base part 20 and a display 3 which is fastened to the base part 20 with fastening means known per se, such

as a joint 21. Figure 6b shows the display apparatus of the fifth embodiment of the invention fastened to a wall.

[0021] Figure 7a shows in a side view a display apparatus according to the sixth embodiment of the invention placed on a table. The display apparatus comprises a base part 1, a display 3 and an arm part 2. The arm part 2 is bent so that the display 3 fastened to it has a desired maximum inclination when the display apparatus is placed on a table. The arm part 2 is fastened to the base part 1 with a technique known *per se*, such as a joint 22. Figure 7b shows the display apparatus of the sixth embodiment of the invention fastened to a wall.

[0022] Figure 8 shows in a front view a display apparatus according to the seventh embodiment of the invention. The display apparatus comprises a base part 23 and a display 3 which can be fastened to each other with a technique known *per se*, such as in any manner presented above. The display 3 comprises a camera 24 which is fastened to the display 3 with a technique known *per se*, which enables the camera 24 to be angled. The camera can be fastened to the display with a ball joint or with a telescopic arm, whereby the angling of the camera does not depend on the angle of the display. On the other hand, the camera can also be fixed to the display, because in multimedia equipment the most important task of the camera is generally to photograph the user, i.e. the person viewing the display, whereby this person can participate in a video conference.

[0023] When a camera is mounted in connection with the display in the display apparatus according to the invention, for instance in the manner according to figure 8, then the result is a multimedia equipment which can be used in many ways in a flexible manner: the base part according to the invention provides the user a possibility to place the display on a table top, on any wall or even on the ceiling or floor, whereby problems caused by the external lighting and/or by the room lighting can be avoided when the camera is used.

[0024] The display 3 further comprises control means 6 for the display. The base part 23 of the display apparatus comprises an audio apparatus which comprises i. a. a microphone 10 and a number of controls 11.

Claims

1. Display apparatus comprising a display (3) and, connected to the display, a base part which forms a support surface for supporting the display apparatus on a substantially planar surface, characterised in that

- the display (3) and the base part can be moved in relation to each other, at least to a first operating position and to a second operating position, of which in the first operating position the direction of the support surface differs substan-

tially 90 degrees from the direction of the support surface in the second operating position, and

- further the base part of the display apparatus comprises fastening means (14) for fastening the display apparatus to a substantially planar surface.

2. A display apparatus according to claim 1, characterised in that the first operating position is a wall operating position, where the support surface is vertical and a considerable part of the base part is below the display (3).

3. A display apparatus according to claim 1, characterised in that the second operating position is a table operating position where the support surface is horizontal and the centre of gravity of the display apparatus is on a vertical line passing through the support surface.

4. A display apparatus according to claim 1, characterised in that the base part comprises

- a support part (1) forming the support surface, and
- an arm part (2), which can be moved in relation to the support part (1).

5. A display apparatus according to claim 4, characterised in that the arm part (2) comprises a basic part and an extension part (9), which can be moved in relation to the basic part.

6. A display apparatus according to claim 4, characterised in that the arm part (2) of the base part is connected to the display (3) with a member comprising at least two parts, which parts of the member can be moved in relation to each other.

7. A display apparatus according to claim 4, characterised in that the support part (1) and the arm part (2) of the base part are connected to each other with a member comprising at least two parts, which parts of the member can be moved in relation to each other.

8. A display apparatus according to claim 1, characterised in that the base part comprises a support part (1), an arm part (2) and at least one additional arm.

9. A display apparatus according to claim 8, characterised in that the additional arm comprises an extension part (16).

10. A display apparatus according to claim 8, characterised in that the parts of the base part are con-

nected to each other and/or to the display (3) with a member comprising at least two parts, which parts of the member are movable in relation to each other.

11. A display apparatus according to claim 1, characterised in that the base part (20) comprises one part. 5
12. A display apparatus according to claim 11, characterised in that the base part (20) is connected to the display (3) with a member comprising at least two parts, which parts of the member are movable in relation to each other. 10
13. A display apparatus according to claim 1, characterised in that the display (3) can be arranged into a vertical position or a horizontal position by twisting it around a certain rotational axis. 15
14. A display apparatus according to claim 1, characterised in that audio equipment and/or multimedia equipment (10) of the apparatus is arranged in the base part, the equipment comprising speakers, a microphone and/or a camera, and control means (11) for the equipment (10). 20 25
15. A display apparatus according to claim 1, characterised in that a camera (24) is arranged in connection with the display (3), and that audio equipment is arranged in the base part, the equipment comprising a speaker, a microphone (10) and control means (11) for the equipment. 30
16. A display apparatus according to claim 1, characterised in that control means (6) for the display are arranged in the base part. 35
17. A display apparatus according to claim 1, characterised in that in the base part there is arranged a space (13) for the cables (12) of the apparatus. 40
18. A method for changing the operating position of a display apparatus comprising a display (3) and a base part connected to the display, whereby the base part forms a support surface for supporting the display apparatus on a substantially planar surface, characterised in that it comprises steps, in which 45
 - the display apparatus is detached from a first planar surface, 50
 - the display (3) and the base part are moved substantially 90 degrees in relation to each other, and
 - the display apparatus is fastened to a second planar surface. 55

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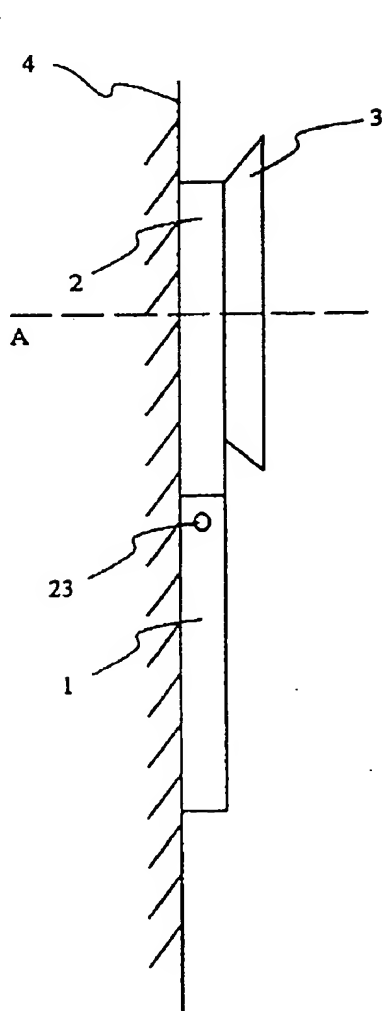


Fig. 1a

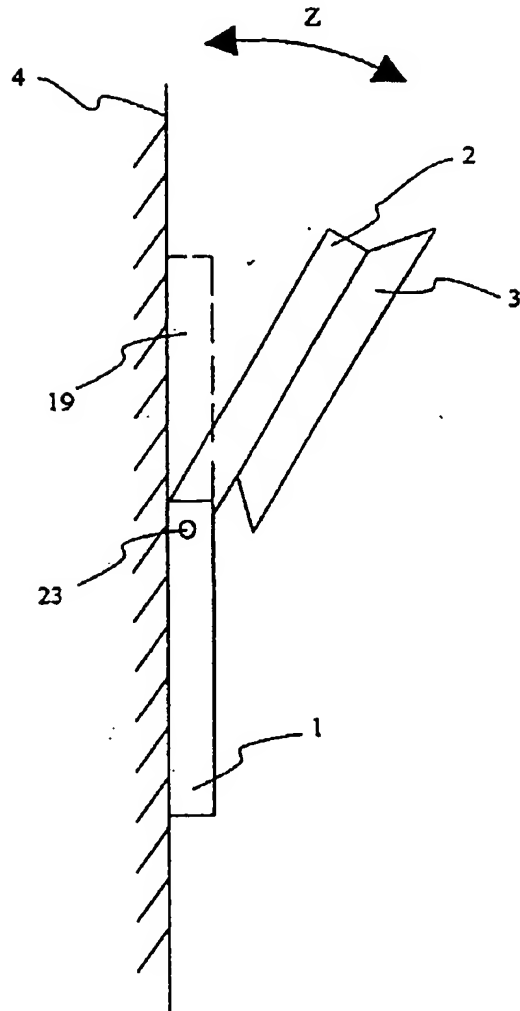


Fig. 1b

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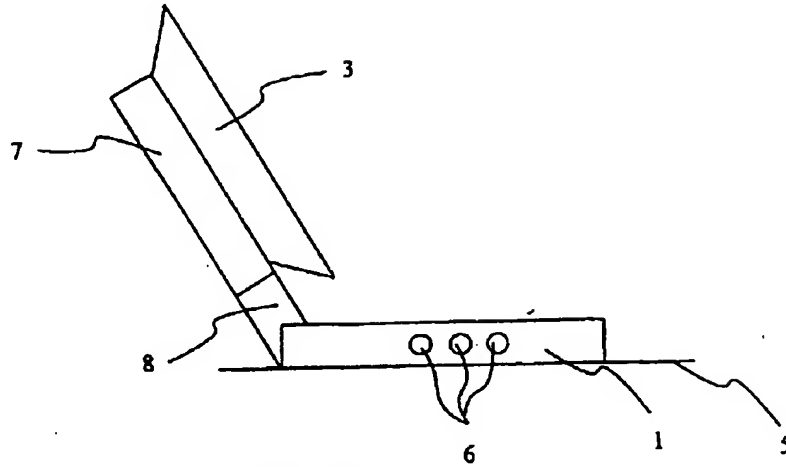


Fig. 2a

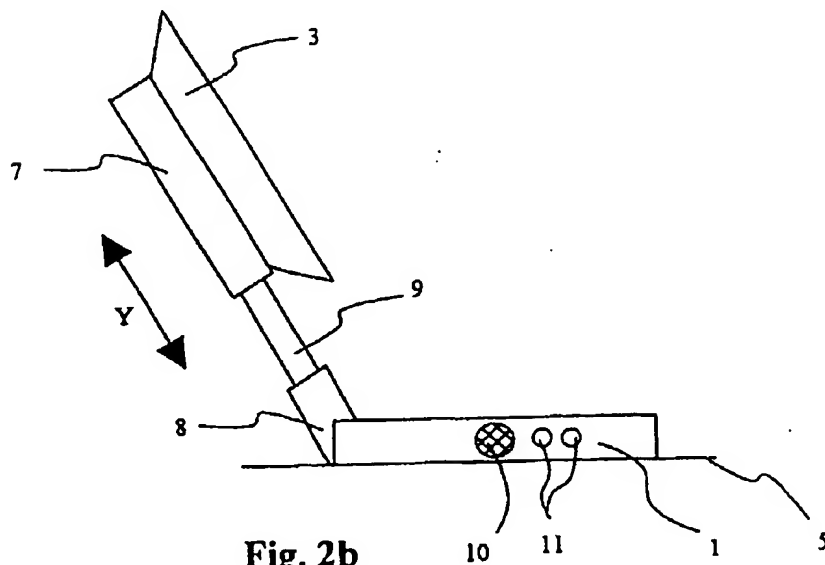
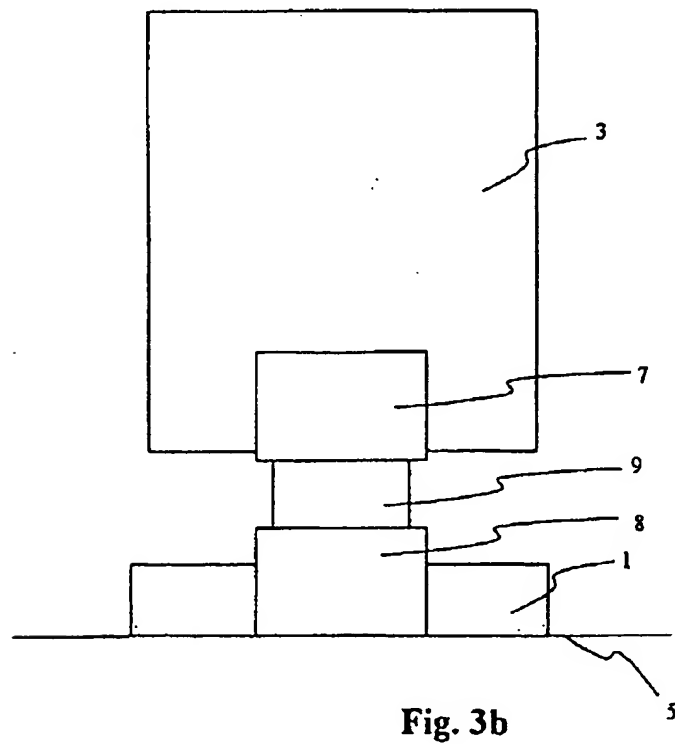
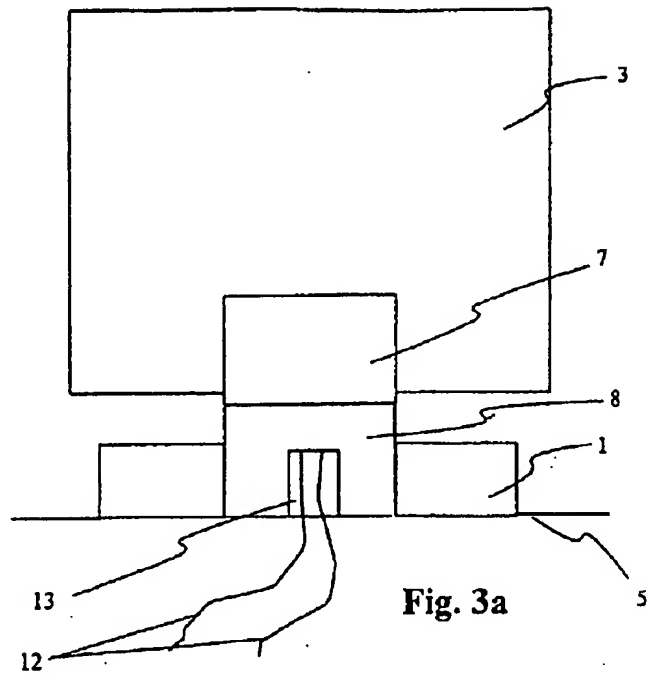


Fig. 2b

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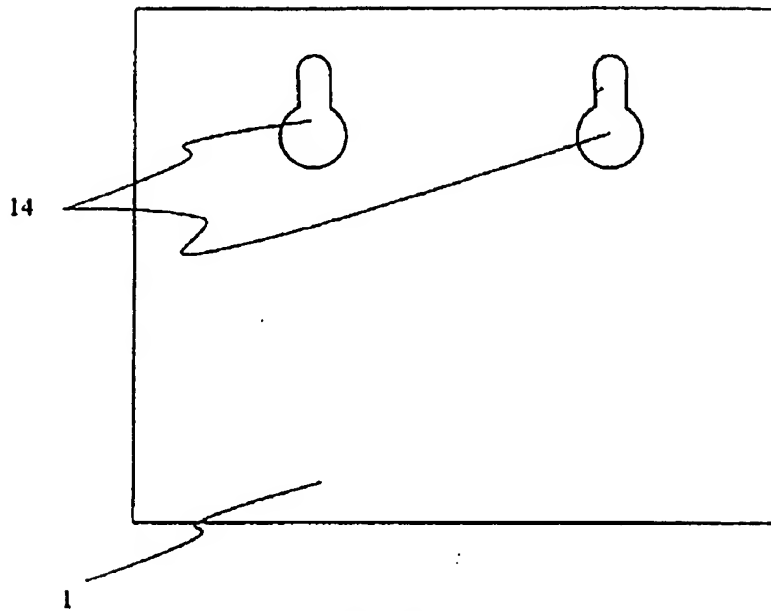


Fig. 4

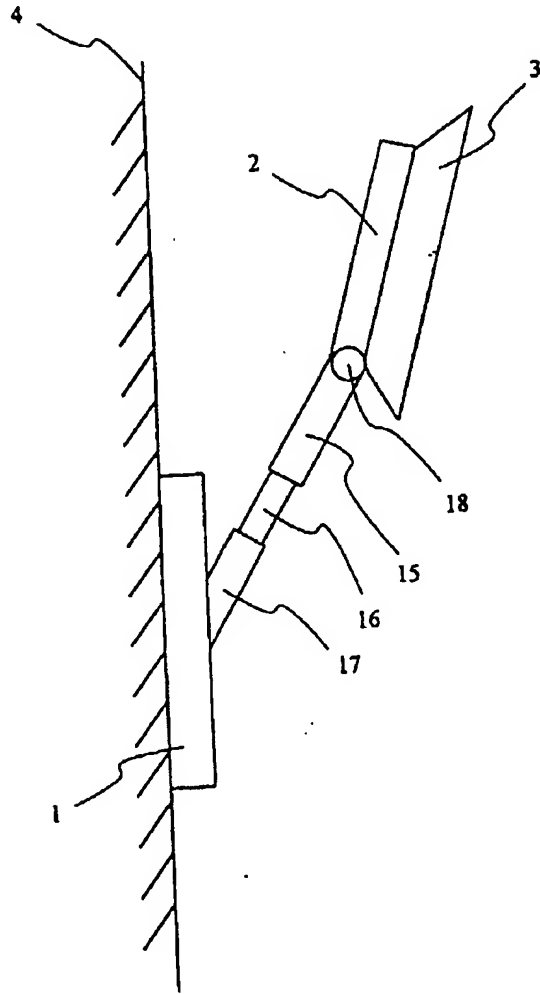


Fig. 5

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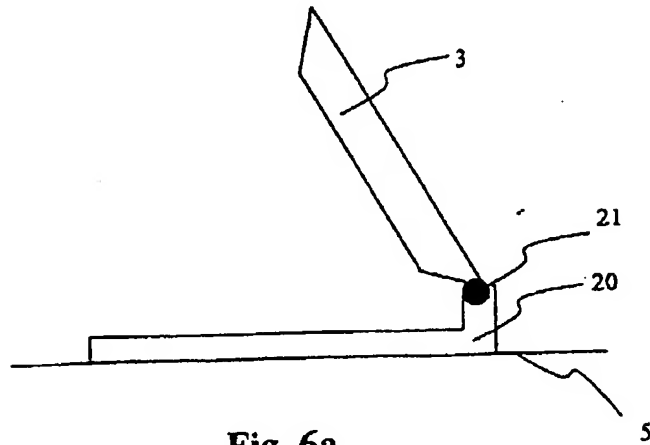


Fig. 6a

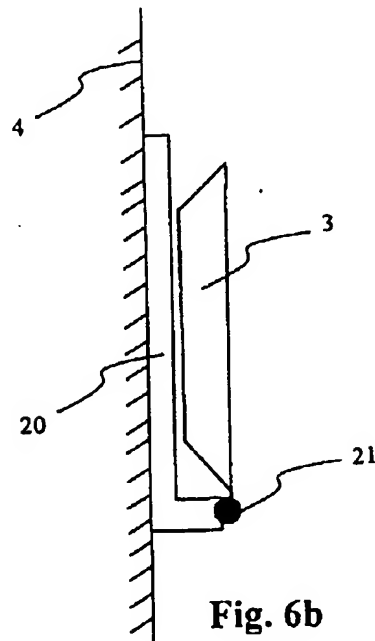


Fig. 6b

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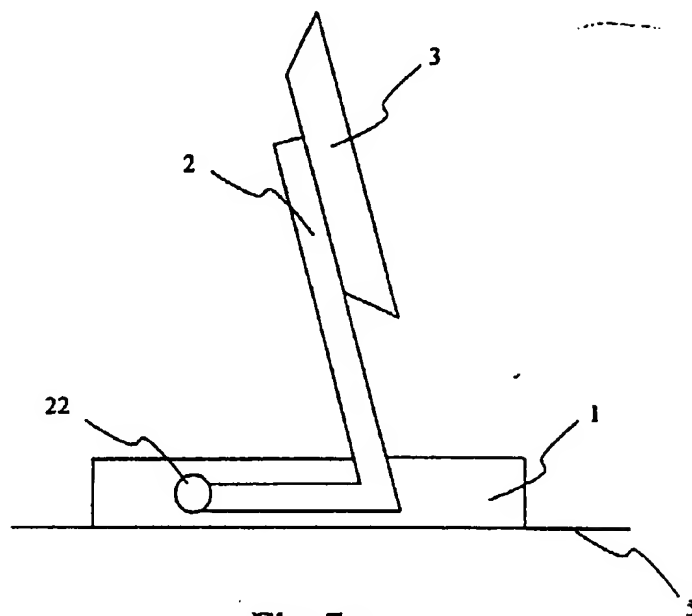


Fig. 7a

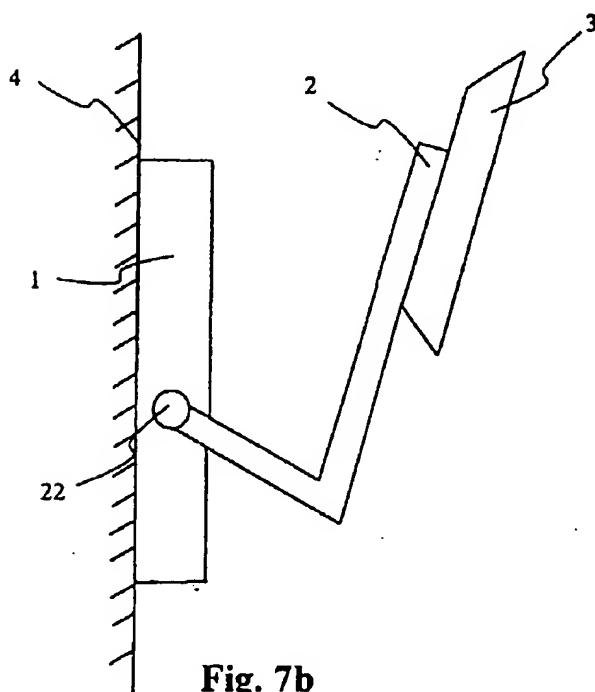


Fig. 7b